**DAYS 1-7: EXPONENT RULES**

**Course: Math - 8 CCSS Standard Number(s): 8.EE.1 Day: 1**

**Unit #1: Expressions and the Number System Block(s)/Period(s): 1 2 3 4 5 6**

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| **Unit Essential Question(s):** | **When would you use the properties of integer exponents?**  **Why would you find rational approximations of irrational numbers?**  **In what ways can rational numbers be useful?** | | |
| **Learning Target(s)**  **“I can statements”** | **POSITIVE AND NEGATIVE EXPONENTS**   * **I can recognize and apply the properties of positive and negative integer exponents.** * **I can generate equivalent numerical expressions using the properties of integer exponents.** | | |
| **Essential Vocabulary** | |  |  | | --- | --- | | * **Exponent** * **Expression** * **Base** * **Power** | * **Integer** * **Laws of Exponent** * **Whole Numbers** * **Positive/Negative** | | | |
| **Resources and Materials** | **Teacher** | | **Student** |
| **Interwrite, Projector, Algebra’s Cool 1.4, Powerpoint of Lesson** | | **Algebra’s Cool 1.4, Calculators (only for specific use during lesson)** |
| **8 Mathematical Practices:** | | | |
| 1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics. | | 5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Activating Strategy**  **(Opening Activity)** | **Warm-Up - Students will complete a three-question warm up on a note card (no names) that T will pick up.**  **1. 3 x 3 x 3 x 3 x 3 =**  **2. (3 x 3 x 3) x (3 x 3) =**  **3. (3 x 3 x 3) / (3 x 3) =**  **Review Warm – Up by collecting note cards and quickly looking through them. Pull out a few that are incorrect, re-write so students don’t see handwriting, and discuss different ways that student displayed answers.**  **As part of our unit, you will be interviewing for a job at the Real Number Corporation (RNC) by developing presenting a portfolio of mathematical work that displays your knowledge of mathematics. One key skill that the RNC desires in its employees is their ability to be creative and think of different ways to do things.**  **Let’s look back at question #1 of our Warm Up. Discuss in your groups if there is another way we can display or write the expression that changes the way it looks, but does not change its value?**  **Give students 1 minute to discuss and take about 1-2 minutes for students to share ideas. Don’t necessarily push for correctness, but use this as a sort of pre-assessment to see where the class is as a whole.**  **Intro: show funny video of parent/child arguing ( youtube – dad and son argue over taking the car or walk by globalbiohazard). In the video, child and parent banter back and forth.** | | |
| **Cognitive Teaching Strategies**  **Me/We/Few/You**  **(TIP-Teacher input**  **SAP-Student actively participates**  **GP – Guided Practice**  **IP-Independent Practice)** | **Me – Begin to discuss how the video relates to the math concept of exponents. As this is done, introduce vocabulary. For example, “Just like in the video you and I argue with our parents at times. In the math world, parents and children always argue at home about a particular topic. Instead of home, we are going to use the word BASE. In order for you to argue with your parent, you must be or have the same base, otherwise, you will be arguing with someone else’s parent – which doesn’t do any good! The number of the base represents what you or your parent is trying to say.**  **This little number that goes on top of the base called an EXPONENT represents you or your parent. Positive exponents represent the parent (because they are always right ;) ), while negative exponents represent you ( because you never get your way w/ them!!). The number of the exponent (1,2,3,4, etc...) represents how many times your parent or you are saying what you are arguing about (Base) to the other.**  **Show examples: 1. 42  2. 35 3. -53**  **The examples above show the parent saying something to you in your house (base), what do you think happens if I write this: 3-2? Have students discuss in their groups for a minute and elicit responses. After this, allow students to use calculators to see if they can determine the rule. Give them a minute and reassess.**  **Ok, the example above is of you saying NO to your parent while in your house (base). When we argue with our parents and they either don’t say anything back, or they say things fewer times than us, we “flip the script” on them, which means we move from the top to the bottom of a fraction. This is because you are mad and going to the basement! We can never finish with negativity in our house so whoever is negative has to move to the other floor!**  **Show examples: 1. 4-2  2. 3-5 3. -5-3**  **Ok, what happens if I were to write this: 1. 23 + 42 2. 23 - 42**  **Review with student’s order of operations, and the simple fact that when we see addition and subtraction signs we just add or subtract AFTER we apply the exponent rules.**  **WE – Give 3 problems for the students to work through and give them 3 minutes. Review problems in group, and then whole class.**  **YOU – Give students 10 problems to work on silently – 12 minutes. Show answers and have students self check.** | | |
| **Summarizing Strategy**  **(Closing Activity)** | **Have students explain in their own words in their group the rules for positive and negative exponents, as well as what happens when we add. Have groups share by telling them to stand up and each person can only say one word until they have explained the rule.** | | |
| **Assessment/Homework** | **Give students 10-15 homework problems to complete. One of which is that they must explain what they learned to another person (peer, parent, sibling, etc)** | | |
| **Extending/Refining** | **For students who complete and clearly understand the practice problems, have them get in pairs and write 2 word problems that incorporate using positive and negative exponents.**  **For those who need additional practice, go back and review expanded form and push them to write each problem out. i.e. 35 = 3 x 3 x 3 x 3 x 3 = 9 x 3 x 3 x 3 = 27 x 3 x 3 .....** | | |

**Course: Math - 8 CCSS Standard Number(s): 8.EE.1 Day: 2**

**Unit #1: Expressions and the Number System Block(s)/Period(s): 1 2 3 4 5 6**

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| **Unit Essential Question(s):** | **When would you use the properties of integer exponents?**  **Why would you find rational approximations of irrational numbers?**  **In what ways can rational numbers be useful?** | | |
| **Learning Target(s)**  **“I can statements”** | **MULTIPLICATION AND DIVISION OF EXPONENTS WITH LIKE BASES**   * **I can recognize and apply the properties of positive and negative integer exponents.** * **I can generate equivalent numerical expressions using the properties of integer exponents.** | | |
| **Essential Vocabulary** | |  |  | | --- | --- | | * **Exponent** * **Expression** * **Base** | * **Integer** * **Laws of Exponent** * **Whole Numbers** * **Positive/Negative** | | | |
| **Resources and Materials** | **Teacher** | | **Student** |
| **Interwrite, Projector, Algebra’s Cool 1.4, Powerpoint of Lesson** | | **Algebra’s Cool 1.4** |
| **8 Mathematical Practices:** | | | |
| 1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics. | | 5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Activating Strategy**  **(Opening Activity)** | **Warm-Up - Students will complete a three-question warm up on a note card (no names) that T will pick up.**  **1. 43 + 22 =**  **2. 10-1 x 52 =**  **3. 3-2 + 62 - 2 =**  **Review Warm – Up by collecting note cards and quickly looking through them. Pull out a few that are incorrect, re-write, and discuss misconceptions that student may have had.**  **Review HW and show another video of parents/children arguing (youtube fake crying for cookies)** | | |
| **Cognitive Teaching Strategies**  **Me/We/Few/You**  **(TIP-Teacher input**  **SAP-Student actively participates**  **GP – Guided Practice**  **IP-Independent Practice)** | **Me – Review previous days rules, address misconceptions. Ok, yesterday, we worked through the parent saying yes, or the child saying no. Now let’s see what happens when the argument happens back and forth in your house.**  **Remember, when we add or subtract, nothing changes. What do you think happens when we have this: 24 x 23?**  **24 x 73?**  **Discuss again the importance of like bases and introduce the rule of adding exponents when like bases are multiplied.**  **What about: 24 x 2-3? How is this different? Discuss in groups and whole class to further refine rule for multiplication.**  **Show examples: 1. 42 x 45 2. 3-2 x 34 3. 44 x 4-7**  **The examples above show you and your parent arguing on the same floor in your house. At the end of the argument, if you won, you moved down the basement!! What happens if I give you something like this:**  **43/42 ? Discuss**  **43/4-2 ? Discuss**  **How are these similar? Different? Are the answers the same? Why?**  **Review and Discuss how we cannot have negative exponents on the bottom of a fraction (no negativity in the basement) and formulate general rules for exponent multiplication and division.**  **Show examples: 1. 42 / 45 2. 3-2 / 34 3. 44 / 4-7**  **WE – Give 3 problems for the students to work through and give them 3 minutes. Review problems in group, and then whole class.**  **YOU – Give students 10 problems to work on silently – 12 minutes. Show answers and have students self check.** | | |
| **Summarizing Strategy**  **(Closing Activity)** | **Have students explain in their own words in their group the rules for multiplication and division exponents with like bases. Have groups share by telling them to stand up and each person can only say one word until they have explained the rule.** | | |
| **Assessment/Homework** | **Give students 10-15 homework problems to complete. One of which is that they must explain what they learned to another person (peer, parent, sibling, etc). Be sure to include a few problems with unlike bases.** | | |
| **Extending/Refining** | **??** | | |

**Course: Math - 8 CCSS Standard Number(s): 8.EE.1 Day: 3**

**Unit #1: Expressions and the Number System Block(s)/Period(s): 1 2 3 4 5 6**

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| **Unit Essential Question(s):** | **When would you use the properties of integer exponents?**  **Why would you find rational approximations of irrational numbers?**  **In what ways can rational numbers be useful?** | | |
| **Learning Target(s)**  **“I can statements”** | **RAISING A POWER TO A POWER**   * **I can recognize and apply the properties of positive and negative integer exponents.** * **I can generate equivalent numerical expressions using the properties of integer exponents.** | | |
| **Essential Vocabulary** | |  |  | | --- | --- | | * **Exponent** * **Expression** * **Base** * **Power** | * **Integer** * **Laws of Exponent** * **Whole Numbers** * **Positive/Negative** | | | |
| **Resources and Materials** | **Teacher** | | **Student** |
| **Interwrite, Projector, Algebra’s Cool 1.4, Powerpoint of Lesson** | | **Algebra’s Cool 1.4** |
| **8 Mathematical Practices:** | | | |
| 1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics. | | 5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Activating Strategy**  **(Opening Activity)** | **Warm-Up - Students will complete a three-question warm up on a note card (no names) that T will pick up.**  **1. 23 x 22 =**  **2. 23 / 22 =**  **3. 33 x 22 x 22 / 34 =**  **Review Warm – Up by collecting note cards and quickly looking through them. Pull out a few that are incorrect, re-write, and discuss misconceptions that student may have had.**  **Review HW and show another video of child comedian (youtube zayzay) talking about yelling parents.** | | |
| **Cognitive Teaching Strategies**  **Me/We/Few/You**  **(TIP-Teacher input**  **SAP-Student actively participates**  **GP – Guided Practice**  **IP-Independent Practice)** | **Me – Review previous days rules, address misconceptions. Ok, lets review what we have learned so far about exponents and how they operate with like bases....Put a problem on the board that covers each concept learned and have a student re-teach the class.**  **Ok, good. Now, someone tell me a little bit about this expression:**  **6 (3+2) x 5 🡪 what about (5+2)2  🡪 what about this (53)2**  **Discuss writing out in expanded form numerical expression. So, using our example of parents and children arguing, in this case the parent or child is outside the house and yelling so loud that it multiplies how loud it would be if they were inside the house!**  **Show examples: 1. (42) 5 2. (3-2)4 3. (44)-2**  **Review, discuss, and correct misconceptions.**  **WE – Give 3 problems for the students to work through and give them 3 minutes. Review problems in group, and then whole class.**  **YOU – Give students 10 problems to work on silently – 12 minutes. Show answers and have students self check.**  **This should not take up the entire period. To finish, have students play a bingo game where you give them various problems and they match up the answers.** | | |
| **Summarizing Strategy**  **(Closing Activity)** | **This should not take up the entire period. To finish, have students play a bingo game where you give them various problems and they match up the answers.** | | |
| **Assessment/Homework** | **Give students 10-15 homework problems to complete.** | | |
| **Extending/Refining** | **??** | | |

**Course: Math - 8 CCSS Standard Number(s): 8.EE.1 Day: 4**

**Unit #1: Expressions and the Number System Block(s)/Period(s): 1 2 3 4 5 6**

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| **Unit Essential Question(s):** | **When would you use the properties of integer exponents?**  **Why would you find rational approximations of irrational numbers?**  **In what ways can rational numbers be useful?** | | |
| **Learning Target(s)**  **“I can statements”** | **ZERO POWER RULE**   * **I can recognize and apply the properties of positive and negative integer exponents.** * **I can generate equivalent numerical expressions using the properties of integer exponents.** | | |
| **Essential Vocabulary** | |  |  | | --- | --- | | * **Exponent** * **Expression** * **Base** * **Power** | * **Integer** * **Laws of Exponent** * **Whole Numbers** * **Positive/Negative** | | | |
| **Resources and Materials** | **Teacher** | | **Student** |
| **Interwrite, Projector, Algebra’s Cool 1.4, Powerpoint of Lesson** | | **Algebra’s Cool 1.4, Graph Paper, Ruler, Markers** |
| **8 Mathematical Practices:** | | | |
| 1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics. | | 5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Activating Strategy**  **(Opening Activity)** | **Warm-Up - Students will complete a three-question warm up on a note card (no names) that T will pick up.**  **1. 73 / 72 =**  **2. (23)2 =**  **3. (3)3 x (2)2=**  **Review Warm – Up by collecting note cards and quickly looking through them. Pull out a few that are incorrect, re-write, and discuss misconceptions that student may have had.**  **Review HW and show of school house rocks (zero is my hero)** | | |
| **Cognitive Teaching Strategies**  **Me/We/Few/You**  **(TIP-Teacher input**  **SAP-Student actively participates**  **GP – Guided Practice**  **IP-Independent Practice)** | **Me – Review previous days rules, address misconceptions.**  **Ok, good. Now, someone tell me a little bit about this problem:**  **(53)2🡪 what about (53)0🡪 what about this 50**  **Discuss any ideas the students have. As long as they have not used a calculator, they most likely will not have the answer of 1. Next, assign groups a random number from 2 – 10. Have students in each group figure their number to the 5th, 4th, 3rd, 2nd, 1st, 0, -1st -2nd, -3rd, -4th, -5th. Next, using graph paper that has the axis predrawn, have students create a table of their results on the board. Finally, have students plot their results on their graph.**  **To continue, use excel or other software to consolidate all of the groups data. As this is done, ask students to talk in their groups about any pattern that they notice. To culminate, finalize a general rule for the zero power.**  **Show examples: 1. (40) 5 2. (3-2)0 3. (40)-2**  **Review, discuss, and correct misconceptions.**  **WE – Give 3 problems for the students to work through and give them 3 minutes. Review problems in group, and then whole class.**  **YOU – Give students 10 problems to work on silently – 12 minutes. Show answers and have students self check. Be sure to include various problems from other rules to spiral down.** | | |
| **Summarizing Strategy**  **(Closing Activity)** | **This should not take up the entire period. To finish, have students play a bingo game where you give them various problems and they match up the answers.** | | |
| **Assessment/Homework** | **Give students 10-15 homework problems to complete.** | | |
| **Extending/Refining** | **??** | | |

**Course: Math - 8 CCSS Standard Number(s): 8.EE.1 Day: 5**

**Unit #1: Expressions and the Number System Block(s)/Period(s): 1 2 3 4 5 6**

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| **Unit Essential Question(s):** | **When would you use the properties of integer exponents?**  **Why would you find rational approximations of irrational numbers?**  **In what ways can rational numbers be useful?** | | |
| **Learning Target(s)**  **“I can statements”** | **PERFORMANCE TASK DAY**   * **I can recognize and apply the properties of positive and negative integer exponents.** * **I can generate equivalent numerical expressions using the properties of integer exponents.** | | |
| **Essential Vocabulary** | |  |  | | --- | --- | | * **Exponent** * **Expression** * **Base** * **Power** | * **Integer** * **Laws of Exponent** * **Whole Numbers** * **Positive/Negative** | | | |
| **Resources and Materials** | **Teacher** | | **Student** |
| **Interwrite, Projector, Algebra’s Cool 1.4, Powerpoint of Lesson** | | **Algebra’s Cool 1.4, Paper, markers, crayons, glue, etc.** |
| **8 Mathematical Practices:** | | | |
| 1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics. | | 5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Activating Strategy**  **(Opening Activity)** | **Warm-Up - Students will complete a five-question warm up on a note card (no names) that T will pick up covering each rule.**    **Review Warm – Up by collecting note cards and quickly looking through them. Pull out a few that are incorrect, re-write, and discuss misconceptions that student may have had.**  **Review HW** | | |
| **Cognitive Teaching Strategies**  **Me/We/Few/You**  **(TIP-Teacher input**  **SAP-Student actively participates**  **GP – Guided Practice**  **IP-Independent Practice)** | **Me – Introduce Performance Task #1 located on GEMS, go over expectations, rubric, etc.**  **YOU – Students will have entire class period to complete task.** | | |
| **Summarizing Strategy**  **(Closing Activity)** | **If time permits, have students share their tasks.** | | |
| **Assessment/Homework** | **No homework** | | |
| **Extending/Refining** | **??** | | |

**Course: Math - 8 CCSS Standard Number(s): 8.EE.1 Day: 6**

**Unit #1: Expressions and the Number System Block(s)/Period(s): 1 2 3 4 5 6**

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| **Unit Essential Question(s):** | **When would you use the properties of integer exponents?**  **Why would you find rational approximations of irrational numbers?**  **In what ways can rational numbers be useful?** | | |
| **Learning Target(s)**  **“I can statements”** | **REVIEW DAY/TASK SHARE**   * **I can recognize and apply the properties of positive and negative integer exponents.** * **I can generate equivalent numerical expressions using the properties of integer exponents.** | | |
| **Essential Vocabulary** | |  |  | | --- | --- | | * **Exponent** * **Expression** * **Base** * **Power** | * **Integer** * **Laws of Exponent** * **Whole Numbers** * **Positive/Negative** | | | |
| **Resources and Materials** | **Teacher** | | **Student** |
| **Interwrite, Projector, Powerpoint of Lesson, CPS** | | **CPS clickers, paper, etc.** |
| **8 Mathematical Practices:** | | | |
| 1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics. | | 5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Activating Strategy**  **(Opening Activity)** | **Warm-Up - Students will complete a five-question warm up on a note card (no names) that T will pick up covering each rule.**    **Review Warm – Up by collecting note cards and quickly looking through them. Pull out a few that are incorrect, re-write, and discuss misconceptions that student may have had.**  **Review HW** | | |
| **Cognitive Teaching Strategies**  **Me/We/Few/You**  **(TIP-Teacher input**  **SAP-Student actively participates**  **GP – Guided Practice**  **IP-Independent Practice)** | **Me – Facilitate sharing of task #1**  **Me/You – Play game centered on review of exponent rules. Make sure it is a game that incorporates both group and individual play.** | | |
| **Summarizing Strategy**  **(Closing Activity)** | **Review final misconceptions for test along with expectations of post test writing assignment. I have students take a magazine of their choice (that I have provided), read an article, and write a one paragraph summary (5 sentences) of the articles and 3 sentences discussing how math is or could relate or be used in the article topic.** | | |
| **Assessment/Homework** | **Study for Test using their notes, hw, and task** | | |
| **Extending/Refining** | **??** | | |

**Course: Math - 8 CCSS Standard Number(s): 8.EE.1 Day: 7**

**Unit #1: Expressions and the Number System Block(s)/Period(s): 1 2 3 4 5 6**

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| **Unit Essential Question(s):** | **When would you use the properties of integer exponents?**  **Why would you find rational approximations of irrational numbers?**  **In what ways can rational numbers be useful?** | | |
| **Learning Target(s)**  **“I can statements”** | **Test Day**   * **I can recognize and apply the properties of positive and negative integer exponents.** * **I can generate equivalent numerical expressions using the properties of integer exponents.** | | |
| **Essential Vocabulary** | |  |  | | --- | --- | | * **Exponent** * **Expression** * **Base** * **Power** | * **Integer** * **Laws of Exponent** * **Whole Numbers** * **Positive/Negative** | | | |
| **Resources and Materials** | **Teacher** | | **Student** |
| **Test for Students and Magazines** | | **Test for Students and Magazines** |
| **8 Mathematical Practices:** | | | |
| 1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics. | | 5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Activating Strategy**  **(Opening Activity)** | **Warm-Up - Students will complete a five-question warm up on a note card (no names) that T will pick up covering each rule.**    **Review Warm – Up by collecting note cards and quickly looking through them. Pull out a few that are incorrect, re-write, and discuss misconceptions that student may have had.**  **Review HW** | | |
| **Cognitive Teaching Strategies**  **Me/We/Few/You**  **(TIP-Teacher input**  **SAP-Student actively participates**  **GP – Guided Practice**  **IP-Independent Practice)** | **Me – Facilitate sharing of task #1**  **Me/You – Play game centered on review of exponent rules. Make sure it is a game that incorporates both group and individual play.** | | |
| **Summarizing Strategy**  **(Closing Activity)** | **I have students take a magazine of their choice (that I have provided), read an article, and write a one paragraph summary (5 sentences) of the articles and 3 sentences discussing how math is or could relate or be used in the article topic.** | | |
| **Assessment/Homework** | **Article Assignment** | | |
| **Extending/Refining** | **??** | | |

**DAYS 8 – 10: SCIENTIFIC NOTATION**

**Course: Math - 8 CCSS Standard Number(s): 8.EE.4 Day: 8**

**Unit #1: Expressions and the Number System Block(s)/Period(s): 1 2 3 4 5 6**

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| **Unit Essential Question(s):** | **When would you use the properties of integer exponents?**  **Why would you find rational approximations of irrational numbers?**  **In what ways can rational numbers be useful?** | | |
| **Learning Target(s)**  **“I can statements”** | * **I can represent very large and very small numbers using scientific notation.** * **I can choose appropriate units of measure for very large and very small numbers.** | | |
| **Essential Vocabulary** | |  |  | | --- | --- | | * **Scientific Notation** * **Power of 10** | * **Standard Form of a Number** | | | |
| **Resources and Materials** | **Teacher** | | **Student** |
| **Interwrite, Projector, PowerPoint of Lesson** | | **OnCore 1-2** |
| **8 Mathematical Practices:** | | | |
| 1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics. | | 5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Activating Strategy**  **(Opening Activity)** | **Warm-Up -**  **Write each number in another way that does not change the value. (if you don’t remember what it is...ask someone in your group).**  **1. The world’s population: 6,880,000,000**  **2. The mass of a proton: .0000000000000000000000017 grams**    **Review Warm – Up by collecting note cards and quickly looking through them. Pull out a few that are incorrect, re-write, and discuss ideas that student may have had. Do not stress correctness but use this as a pre-assessment.**  **Now we move to a more scalable number. See if you can write these numbers in a different way.**  **1. 25 2. 250 3. 2500 4. 2500000000** | | |
| **Cognitive Teaching Strategies**  **Me/We/Few/You**  **(TIP-Teacher input**  **SAP-Student actively participates**  **GP – Guided Practice**  **IP-Independent Practice)** | **Me – One major component of you interview process with the Real Number Corporation is your understanding of very large and very small numbers. While we often use very large and very small numbers, as you saw in the video, we sometimes do not wish to write that number out in standard form, but rather write it in a different form (scientific notation) so that we can read it more easily. Show example of my engineering reports that use scientific notation to display numbers as well as the largeness and smallness of numbers.**    **Show video on the largeness of numbers that we deal with. (Discovery education vast distances/scientific notation video – 3:24) and then move toward an example modeling how we move decimal places**  **Let’s try a few really big numbers: (Use ? #’s 25, 38, and 39 as a challenge on page 107 of Glencoe Math 8 book)**  **See if you can write these numbers in a different way.**  **1. .25 2. .025 3. .0025 4. .0000000025**  **0.000000901 How can we write this in scientific notation? Discuss in groups and share ideas.**  **Show video on discovery “scientific notation of very low numbers-dna”**  **Let’s try a few really small numbers: (Use ? #’s 26, 37, and 40 as a challenge on page 107 of Glencoe Math 8 book)**  **Review, monitor, correct misconceptions**  **YOU – Give students 10 problems to work on silently – 12 minutes. Show answers and have students self check. Be sure to include various problems from other rules to spiral down.** | | |
| **Summarizing Strategy**  **(Closing Activity)** | **Have students make up their own example of a very large or small number that is applicable to real life.** | | |
| **Assessment/Homework** | **Give students 10-15 homework problems to complete.** | | |
| **Extending/Refining** | **??** | | |

**Course: Math - 8 CCSS Standard Number(s): 8.EE.3,4 Day: 9**

**Unit #1: Expressions and the Number System Block(s)/Period(s): 1 2 3 4 5 6**

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| **Unit Essential Question(s):** | **When would you use the properties of integer exponents?**  **Why would you find rational approximations of irrational numbers?**  **In what ways can rational numbers be useful?** | | |
| **Learning Target(s)**  **“I can statements”** | * **I can write an estimation of a large and small quantity by expressing it as the product of a single digit and a positive power of ten.** * **I can compare quantities written as the product of a single digit number and a power of ten by stating their multiplicative relationships.** * **I can make sense of numbers in scientific notation generated by technology.** | | |
| **Essential Vocabulary** | |  |  | | --- | --- | | * **Scientific Notation** * **Power of 10** | * **Standard Form of a Number** | | | |
| **Resources and Materials** | **Teacher** | | **Student** |
| **Interwrite, Projector, PowerPoint of Lesson** | |  |
| **8 Mathematical Practices:** | | | |
| 1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics. | | 5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Activating Strategy**  **(Opening Activity)** | **Warm-Up -**  **Write each number in scientific notation or standard form given the other.**  **1. 2.08 x 102**  **2. 43,000**  **3. .000000707**  **4. 2.52 x 10-5**  **5. How many seconds was your summer vacation if it was 94 days?**    **Review Warm – Up by collecting note cards and quickly looking through them. Pull out a few that are incorrect, re-write, and discuss ideas that student may have had.**  **Show you tube video on comparing yourself to someone else.** | | |
| **Cognitive Teaching Strategies**  **Me/We/Few/You**  **(TIP-Teacher input**  **SAP-Student actively participates**  **GP – Guided Practice**  **IP-Independent Practice)** | **Me – As a potential employee of RNC, one skill you need to make sure you have is the ability to compare pieces of data. Numbers are useful, but by themselves, they loose some of their power. Often, we use numbers to compare one thing to another in order to make a point.**  **Let’s look at: Use example 4 on page 9 of OnCore lesson 1-2**  **How many times bigger is the weight of the shark compared to the dolphin?**  **Allow students to discuss in groups and formulate ideas, answers, etc. Allow them to use calculators if they wish. Share ideas as a whole class. Do not push for correctness, but see where they are at.**  **Next, break down the question. Push them to see that we are talking about ‘what number we need to multiply the weight of the dolphin by in order to get the weight of the shark. Follow this by breaking down how to determine answer.**    **Let’s try a few examples: (Use ? #’s 17-22 OnCore page 10 1-2) Model first 2 and have students do the rest on their own.**  **YOU – Give students 10 problems to work on silently – 12 minutes. Show answers and have students self check. Be sure to include various problems from other rules to spiral down.**  **This whole portion should be finished in about 30-40 minutes so we can work on understanding scientific notation on the calculator.**  **Walk students through using the calculator with scientific notation using the examples that have been completed so far.** | | |
| **Summarizing Strategy**  **(Closing Activity)** | **Give students two large numbers and have them compare them and then use their calculator to determine if they get the same answer.** | | |
| **Assessment/Homework** | **Give students 10-15 homework problems to complete.** | | |
| **Extending/Refining** | **??** | | |

**Course: Math - 8 CCSS Standard Number(s): 8.EE.4 Day: 10**

**Unit #1: Expressions and the Number System Block(s)/Period(s): 1 2 3 4 5 6**

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| --- | --- | --- | --- |
| **Unit Essential Question(s):** | **When would you use the properties of integer exponents?**  **Why would you find rational approximations of irrational numbers?**  **In what ways can rational numbers be useful?** | | |
| **Learning Target(s)**  **“I can statements”** | * **I can add or subtract two numbers written in scientific notation** * **I can multiply or divide numbers written in scientific notation.** | | |
| **Essential Vocabulary** | |  |  | | --- | --- | | * **Scientific Notation** * **Power of 10** | * **Standard Form of a Number** | | | |
| **Resources and Materials** | **Teacher** | | **Student** |
| **Interwrite, Projector, PowerPoint of Lesson, OnCore 1-3** | |  |
| **8 Mathematical Practices:** | | | |
| 1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics. | | 5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Activating Strategy**  **(Opening Activity)** | **Warm-Up -**  **1. Write .00089 in scientific notation.**  **2. Write 3.2 x 10 4 in standard form?**  **3. How many times bigger is 9 x 1010 than 3 x 107?**  **4. 43 x 44 = ?**  **5. 43 x 74 = ?**    **Review Warm – Up by collecting note cards and quickly looking through them. Pull out a few that are incorrect, re-write, and discuss ideas that student may have had. Focus on making sure students understand/remember that we must have like bases.** | | |
| **Cognitive Teaching Strategies**  **Me/We/Few/You**  **(TIP-Teacher input**  **SAP-Student actively participates**  **GP – Guided Practice**  **IP-Independent Practice)** | **Me – Yesterday we worked on comparing numbers in scientific notation, but often, similar to standard ‘looking’ numbers, we may wish to add, subtract, multiply, or divide. This is a skill RNC is really looking for in its employees.**  **Discuss in your groups how we could add 3.1 x 108 + 3.38 x 10 7**  **Monitor student thinking and push groups, if they think they found a way to add them to try and check their answers on the calculator. This will strengthen their technology ability while fostering their initial understanding of the topic.**  **Allow students to discuss in groups and formulate ideas, answers, etc. Allow them to use calculators if they wish. Share ideas as a whole class. Do not push for correctness, but see where they are.**  **Model some incorrect ways of evaluating this expression. I.e. adding the number portion as is, adding the exponents....Remind them of the ‘rules’ they have learned...like bases...we want them to discover than similar to like bases, they need to have like powers of 10 in order to manipulate the expression.**  **Give 4 problems for practice (2 +, 2 -). Go over each and check for understanding.**  **So, adding and subtracting are pretty straight forward as long as you have the same base. Discuss in your groups how I might evaluate this expression**  **1.89 x 1027 / 5.97 x 1024**  **Allow students to discuss in groups and formulate ideas, answers, etc. Allow them to use calculators if they wish. Share ideas as a whole class. Do not push for correctness, but see where they are.**  **As ideas come, bring class back together and re-write same expression, but break it up:**  **1.89/5.97 x 1027/1024 to see if they are able to see the connection to the exponent rule of division.**  **Continue pushing them to discover the connection between scientific notation and exponent rules when multiplying or dividing.**  **So, what about multiplication:**  **(1.86x105)(4.8x103)**  **Have students explore how to evaluate this expression and then share as class, explore student thinking, etc.**  **Give students 4 practice problems (+, -, \*, / ) and go over answers.**  **Give 10 independent practice problems. Go over answers.** | | |
| **Summarizing Strategy**  **(Closing Activity)** | **Give students two numbers in scientific notation and have them add, subtract, multiply, and divide them.** | | |
| **Assessment/Homework** | **Give students 10-15 homework problems to complete.** | | |
| **Extending/Refining** | **??** | | |

**DAYS 11 : SQUARE AND CUBE ROOTS**

**Course: Math - 8 CCSS Standard Number(s): 8.EE.2 Day: 11**

**Unit #1: Expressions and the Number System Block(s)/Period(s): 1 2 3 4 5 6**

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| --- | --- | --- | --- |
| **Unit Essential Question(s):** | **When would you use the properties of integer exponents?**  **Why would you find rational approximations of irrational numbers?**  **In what ways can rational numbers be useful?** | | |
| **Learning Target(s)**  **“I can statements”** | * **I can recall my perfect squares and cubes** * **I can recognize taking the square root as the inverse of squaring a number.** * **I can recognize taking the cube root as the inverse of cubing a number.** * **I can evaluate the square root of a perfect square.** * **I can evaluate the cube root of a perfect cube.** | | |
| **Essential Vocabulary** | |  |  | | --- | --- | | * **square** * **square root** * **cube** * **cube root** | * **perfect square** * **radical** * **radicand** | | | |
| **Resources and Materials** | **Teacher** | | **Student** |
| **Interwrite, Projector, PowerPoint of Lesson, OnCore 1-4, Holt 3-5** | |  |
| **8 Mathematical Practices:** | | | |
| 1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics. | | 5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Activating Strategy**  **(Opening Activity)** | **Warm-Up -**  **abstract**  **1. What is 8 x 8?**  **2. What numbers multiplied by themselves give you 81?**  **3. What number multiplied by itself three times gives you 64?**    **Review Warm – Up by collecting note cards and quickly looking through them. Pull out a few that are incorrect, re-write, and discuss ideas that student may have had. Focus on making sure students understand/remember that we must have like bases.**  **After reviewing warm up, have students create a number line from -12 to 12.**  **“In addition to being able to represent numbers in different ways, as a potential employee of RNC, another skill you need to be able to have is the ability to relate numbers to the world around. As you know, numbers are meaningless, unless they mean something to you or me, or someone else.”**  **Have students work in groups: Instruct them to write below each integer on their number line the number multiplied by itself one time. Above the integer on the number line, have students write the integer multiplied by itself three times.**  **This will allow them to begin to see that positive and negative squares or numbers are the same, while positive and negative cubes are opposites.** | | |
| **Cognitive Teaching Strategies**  **Me/We/Few/You**  **(TIP-Teacher input**  **SAP-Student actively participates**  **GP – Guided Practice**  **IP-Independent Practice)** | **Let’s look at all of these numbers. There are a lot of them, but let’s see if we can make some sense from all this mess. In your groups, see if you can draw a picture that shows how some of these numbers relate to one another.**  **Give them two minutes. Walk around and see what they are doing. If they are struggling, draw a square on their paper and walk away. See if they can make some sense using that.**  **Bring whole class back and discuss how these numbers relate to squares and cubes. This will serve as the intro to what square and cube roots are and the importance of them.**  **Vocabulary**  **WE - give students activity sheet that has them find the square or cube root of a number or square/cube a number. Give them 5 minutes to complete independently. Go over answers.**  **After activity sheet, have students explore the relationships/patterns of what happens when we have a negative on the inside or the outside of the radicand.**    **Model several problems for them.**  **YOU – give the extended independent practice on today’s entire lesson.** | | |
| **Summarizing Strategy**  **(Closing Activity)** | **Ticket out the door – two questions.** | | |
| **Assessment/Homework** | **Give students 10-15 homework problems to complete.** | | |
| **Extending/Refining** | **??** | | |

Ignore this

**DAYS 8-19: RATIONAL/IRRATIONAL NUMBERS**

**Course: Math - 8 CCSS Standard Number(s): 8.EE.2 Day: 8**

**Unit #1: Expressions and the Number System Block(s)/Period(s): 1 2 3 4 5 6**

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| --- | --- | --- | --- |
| **Unit Essential Question(s):** | **When would you use the properties of integer exponents?**  **Why would you find rational approximations of irrational numbers?**  **In what ways can rational numbers be useful?** | | |
| **Learning Target(s)**  **“I can statements”** | * **I can recall my perfect squares and cubes.** * **I can recognize taking the square root as the inverse of squaring a number.** * **I can recognize taking the cube root as the inverse of cubing a number.** | | |
| **Essential Vocabulary** | |  |  | | --- | --- | | * **Cube** * **Cube Root** * **Square** * **Square Root** | * **Repeating Decimal** | | | |
| **Resources and Materials** | **Teacher** | | **Student** |
| **On Core 1-5, Algebra’s Cool 1.1, Interwrite, Projector, Powerpoint of Lesson** | | **On Core 1-5**  **Algebra’s Cool 1.1** |
| **8 Mathematical Practices:** | | | |
| 1. Make sense of problems and persevere in solving them.  2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  4. Model with mathematics. | | 5. Use appropriate tools strategically.  6. Attend to precision.  7. Look for and make use of structure.  8. Look for and express regularity in repeated reasoning. | |
| **Activating Strategy**  **(Opening Activity)** | **Warm-Up - Students will complete a three-question warm up on a note card (no names) that T will pick up. Write each number in decimal form.**  **1. ¼ 2. 4/2 3. 7/8**    **Review Warm – Up by collecting note cards and quickly looking through them. Pull out a few that are incorrect, re-write, and discuss misconceptions that student may have had.** | | |
| **Cognitive Teaching Strategies**  **Me/We/Few/You**  **(TIP-Teacher input**  **SAP-Student actively participates**  **GP – Guided Practice**  **IP-Independent Practice)** | **Me – Facilitate sharing of task #1**  **Me/You – Play game centered on review of exponent rules. Make sure it is a game that incorporates both group and individual play.** | | |
| **Summarizing Strategy**  **(Closing Activity)** | **I have students take a magazine of their choice (that I have provided), read an article, and write a one paragraph summary (5 sentences) of the articles and 3 sentences discussing how math is or could relate or be used in the article topic.** | | |
| **Assessment/Homework** | **Article Assignment** | | |
| **Extending/Refining** | **??** | | |